

# Perceptions of Simulation Efficacy Revisited

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## Abstract

**Background:** Providing appropriate clinical placement has become increasingly difficult over the past several years. To meet the need, schools of nursing are using simulation laboratory experiences in place of direct patient care. The COVID-19 pandemic pushed many students out of patient care environments and into the simulation laboratory. **Methods:** Repeating the research done in 2015, a qualitative case study design and the constructivist theory were again used. Recently graduated registered nurses were interviewed to answer the research questions: How do recent graduates of registered nurse (RN) education programs view the simulation lab experiences from nursing school, and what changes were made to your simulation experiences as a result of COVID-19? **Results:** Eight participants completed virtual or survey interviews. The data were coded and grouped into the same five themes from the previous research. The data revealed that there have not been significant changes in perceived simulation experiences in the past seven years. **Conclusions:** The recently graduated nurse has valuable insight regarding the efficacy of simulation laboratory experiences in preparation for real-world nursing. This insight can be used by schools of nursing to design effective simulation experiences.

## Keywords

Simulation, Nursing, Mannequin, Nursing Education, Clinical

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## 1. Background

According to the American Association of Colleges of Nursing (AACN) the single most important factor limiting the growth of nursing schools is the lack of clinical placement sites [1]. Finding adequate, quality clinical placement for nursing students has been challenging over the past decade. One method widely used to address the shortage is simulation laboratory experiences.

The use of simulation in the medical field has a long history. As early as 1911,

the Hartford Training School utilized a mannequin named Mrs. Chase. She had jointed limbs and students found her to be so helpful that improvements were made and a few years later she had a wig, more life-like skin, and several body orifices [2]. The use of medical simulation continued to increase and in the early 1960s, the Laerdal company created Resusci Anne® a mannequin for teaching cardiopulmonary resuscitation [2]. Improvements have continued in the sixty years since the debut of Anne and now we have mannequins that cry, speak, breathe, and even highly specialized mannequins that give birth [3] [4]. As mannequins have become more sophisticated, they have become more expensive. Superior mannequins are approximately \$70,000 and are capable of realistic wound presentation, computerized heart rates, pulses, and voices that can cry, cough, moan and make other sounds [5].

The growing use of simulation in nursing education has prompted a need for implementation guidelines and information regarding best practices [6]. The National Council of State Boards of Nursing (NCSBN) determined that there was no statistically significant difference in knowledge acquisition and clinical performance in groups replacing 10%, 25% or 50% of clinical hours with simulation [7]. The International Nursing Association for Clinical Simulation and Learning (INACSL) has clearly defined best practices to assist faculty in designing simulation experiences. They provide guidance for faculty in design, outcomes, and developing realistic scenarios [8].

## 2. Theoretical Framework

The conceptual framework for this qualitative research study was constructivist theory. Participants were interviewed regarding their personal interpretation of the value of simulation. The constructivist stance maintains people seek to construct meaning and make sense of their experience [9]. As the learner engages in a process of experience and reflection, the learner creates a personal interpretation of the learning experience [10].

## 3. Methods

In 2015, a research study was conducted using the same interview protocol [11]. The use of simulation has increased significantly since 2015, [12] and the COVID-19 pandemic pushed many students out of patient care environments and into the simulation laboratory [13]. The study was repeated with the addition of one question assessing the impact of COVID-19 on the simulation experience.

A qualitative, case study research design was determined to be the most effective method for gathering the information needed to answer the research questions which were:

- 1) How do recent graduates of registered nurse (RN) education programs view the simulation lab experiences from nursing school?
- 2) What changes were made to your simulation experiences as a result of

## COVID-19?

A large hospital network with facilities in 19 states in North America was contacted and they granted permission for newly graduated nurses in their residency program to volunteer to participate. Using this residency program provided a pool of participants who attended many different schools of nursing and are employed in various locations across the US Institutional Review Board (IRB) approval was obtained from the researchers institution and participants were provided appropriate consent documentation.

The residency program coordinator forwarded an email to the current participants in residency programs across the hospital network. The residency participants were asked to contact the principle investigator if they wished to participate in a virtual interview. The email request was sent twice and three interviews were conducted. When too few responses were received, a link to the interview questions and consent was added to the third email sent to residency participants. A total of 8 interviews were conducted, saturation of themes was reached, and the interview link was removed.

All transcription and coding were done by the principal investigator to allow for immersive contact with the study results. A transcript of the audio recorded telephone interviews was sent to the individual participants via email. Participants had the opportunity to view their own data to ensure accuracy and add any additional clarifying information. All of the participants who responded to the survey were included in results of this study.

The 11 questions on the survey were divided between four categories: questions one and two and eleven collected information about the *procedure of conducting simulation*. Questions four, five, and six were questions related to how simulation *compares to real life*. Questions three, seven, eight, and nine explored the *value and importance of simulation*, and question 10 gathered *additional comments*.

## 4. Results

The five major themes identified by the previous study were also identified in the data from this study. The themes in order of frequency were:

- (a) environmental and technical factors—34%
- (b) preparation for nursing tasks—24%
- (c) human factors—23%
- (d) communication—14%
- (e) caliber of equipment—5%

The participants were identified as: P1, P2, P3, P4, P5, P6, P7, and P8. The transcripts were read multiple times, coded, and the 151 codes identified were assigned to one of the five identified themes.

### 4.1. Procedure of Conducting Simulation

- 1) How often during a semester did you participate in simulation laboratory

experiences involving a human patient simulator (mannequin)?

2) Describe how your nursing school carried out simulation laboratory experiences. Please provide examples.

11) What changes were made to your simulation experiences as a result of COVID-19?

The responses to the questions in the section were coded into the *Environmental and technical factors*, *Preparation for nursing tasks* and *Communication* themes. Seven of the eight participants participated in simulation laboratory experiences every week. Of those seven, two indicated that sometimes there were multiple simulations in a week. Participant five stated, “Depending on the semester, it was usually every other week varying from 4 - 6 hours at a time” (P5).

When describing how simulation experiences were carried out, all but one of the participants indicated that they were split into smaller groups. For one participant, “simulation scenarios at the beginning of nursing school were about 15 minutes long and by the end they were lasting about an hour” (P6). Three of the eight participants indicated that simulations lasted around 30 minutes and the remaining four did not specify a length of time.

Most of the participants had some kind of introduction to the simulation. The introduction types mentioned were: anatomy or intervention review, skills review, a patient chart complete with labs and history sections for review, Instructor led introduction to the scenario, a patient hand-off report, and a week-long study of the simulated patient’s chart and accompanying classroom work to prepare.

A post simulation debrief was mentioned by participants P2, P3, and P6. The value of the debriefing experience is noted by the National League for Nursing (NLN)/Jeffries Simulation theory which provides a model for conducting debriefing and identifies the interaction between the students and facilitator as an important component of debriefing [14]. In the only unfavorable response to the question regarding how simulations were carried out, one participant stated, “The simulations were too controlled. The time I felt I learned best was when I was by myself” (P4).

The AACN noted that the need for nurses increased during the COVID-19 pandemic and access to clinical sites was even more limited during this time [1] [15]. Of the eight participants, two did not experience any changes to their nursing education as a result of COVID-19 (P2 & P3). Both attributed this to being in a rural area with low incidence of COVID-19. The remaining six participants indicated that they were required to wear more personal protective equipment (PPE) than they had prior to the pandemic.

One participant stated that, “Some of them [labs] didn’t happen and some of the online sims were completely not helpful for real world experience whatsoever” (P4). The remaining seven participants continued to participate in in-person simulation laboratory experiences throughout the pandemic and one participant indicated that there were, “...more simulations, instead of more patient encoun-

ters... there was[sic] more simulations” (P8).

#### 4.2. Comparisons to Real-Life

4) Since graduation, what real life situations have you experienced that simulation prepared you for? Please give examples.

5) Since graduation, what real life situations have you experienced that simulation could have prepared you for? Please give examples.

6) How do simulation experiences compare to real life experience in a hospital setting?

All of the eight participants identified aspects of nursing care for which simulation experiences prepared them. Participants noted that they practiced communication with physicians, time management, prioritizing cares, and basic nursing skills. All the participants provided positive examples of real-life experiences that simulation prepared them for including: focused assessments, treating GI bleeds, pulling up medications, SBAR communication, distinguishing lung sounds, managing tubes and drains, giving blood, and cardiac emergencies. These responses mainly reflected the *Preparation for nursing tasks* and *Communication* themes. Participants one and five benefitted from lessons on prioritizing care; “Making assessments efficiently under time constraints, prioritizing patient care” (P1) and “Simulation helped me practice prioritizing” (P5). Participant two shared, “Communication was a big lesson for me that I learned during simulations at nursing school” (P2). Participant three stated that they, “Learned to check their patients thoroughly” (P3). Participants four, six, seven, and eight all expressed feeling prepared by simulation to do basic nursing cares and be aware of the expected outcomes.

When reflecting on what experiences simulation could have prepared them for, the most common response was, “More experience communicating with physicians” (P1). This aligns with the *Communication* theme. Other areas mentioned were more realistic time constraints, more charting practice (specifically what to include to protect their license), and simulations specific to specialties such as labor and delivery, operating room and neonatal intensive care.

Participants felt that simulation experiences were comparable to real-life situations in many ways. Participants commented that, “...simulations are as close to real-life as they can be” (P2), “...they were very close to what could be expected” (P6), and, “...it sets the best groundwork” (P8). It was mentioned that simulation made participants think and problem solve which was good preparation for taking care of actual patients.

#### 4.3. Value and Importance of Simulation

3) What is your perception of your simulation laboratory experiences? Please provide examples.

7) What aspect of simulation did your program do well?

8) Which aspect did they do poorly?

## 9) What aspect do you perceive as most important and why?

Seven of the eight participants perceived simulation experiences as positive. “I really enjoyed it” (P7), “The experiences... did the best at preparing me for actual nursing” (P4), “I was just grateful that we were doing something that was putting us a step forward” (P8), and “I benefitted significantly from the style of simulation that my school did” (P6). The one negative response was related to discomfort at being watched and “feeling nervous and awkward” (P3). This participant also stated that, “the lessons that I learned in simulation stuck with me and I learned so much” (P3).

When reflecting on aspects of simulation that were done well, two of the participants mentioned high-tech and sophisticated equipment, part of the *Caliber of equipment* theme. Participant one stated, “Equipment was so sophisticated” (P1) and participant four stated, “The facility was really nice and the new mannequins were also very high tech” (P4). The value of debriefing was mentioned again in this section.

Creating a safe learning environment where it was okay to make mistakes was mentioned by half of the participants as an aspect of simulation that their program did well. “They made it a really positive learning environment where... we’ll take some time after to go through it again and just walk you through and teach you the proper way so nobody felt like they were being judged or graded” (P7). Other participants stated, “...instructors and classmates created a safe environment for making mistakes” (P1), “...there was a lot of emphasis on, we’re here to improve, not to expect you to be perfect” (P6), “They made an environment that was... very open to like, talk about what you’re thinking and to make mistakes and to learn from your mistakes” (P7), and “You also get a sense of camaraderie” (P8).

When identifying aspects of simulation that were done poorly, participants expressed frustration with realistic equipment and lack of communication from the instructor, “...communication with the instructor for some of that information was probably where my biggest frustration came from” (P6), and “...it would be nice to have better more real life props for the scenario. A lot of things were, you have to imagine this, it would be nice to have some real things to see and hold” (P7).

Of the eight participants, three perceived students’ attitude as the most important aspect of simulation. Participants stated, “I think the most important aspect is the student’s attitude” (P1), “...the attitude, environment and the learning, I think that’s the most important part” (7), and realizing, “You know more than you think you know” (P4). Having a place where you could go to learn and make mistakes was mentioned by two participants, “Taking opportunities to learn and not be scared to try in simulation, because simulation is the time to make mistakes and learn” (P5), and “It’s ok to make mistakes during simulation because that is how we learn” (P2). The topic of caring instructors giving positive feedback was mentioned by two participants; “My first semester of

simulation is where I learned the most because my instructor made sure to give me one positive and one change after every simulation” (P2), and “...having instructors who are caring and willing to teach you the right way was probably the most important part for me” (P7).

#### 4.4. Additional Information

10) What additional information might you provide to assist in better understanding your experience with simulation as a nurse?

All the participants made additional comments, four of the eight shared positive comments about their simulation experiences; “I would not have felt nearly as prepared as I did if I hadn’t had the simulation experience that I had” (P4), “I’m so, so, glad that I had the simulation that I did because I think it prepared me better” (P5), “I enjoy them and I think they’re really important” (P6), and “I have just learned something that is invaluable” (P7). One participant commented that, “Simulations should be flexible and not lead to dead-ends and confusion” (P1), and another commented, “Letting students mess up and dig themselves out of a hole would be a good skill to teach” (P3). Other notable comments were about the importance of attitude on the part of the students, “I understand mindset makes the difference for anything, whether you’re going to have a good time or a bad time...” (P7), and the importance of faculty, “I think that the expectation, the encouragement, and the style of the majority of the clinicals or the simulation experiences that I had we’re so beneficial” (P5). Another topic that was mentioned was the importance of work culture and the ability to ask questions, “the facility...has such a culture of question asking. I know I can ask anyone any question” (P8). The ability to ask and answer questions was also mentioned related to simulation experiences, “It is very important to make sure to give time to answer the questions that have been asked” (P2).

### 5. Discussion

The purpose of this research was to revisit the original research study that was done in 2015 to determine what, if any, changes have occurred in the intervening 7 years. The original ten question interview protocol was used with the addition of the question; What changes were made to your simulation experiences as a result of COVID-19?

After the data were coded and assigned to themes, the themes were ranked in order of frequency. While the order of frequency remained the same, the percentages changed (see [Table 1](#)).

The identification of *equipment and technical factors* decreased in incidence by five percent. It was still the most frequently mentioned theme and remains an important aspect of successful simulation experiences. Findings from this study aligned with the previous study. Participants felt the simulation environment was a safe place to learn and make mistakes. They also identified the hands-on aspect of simulation as a positive factor in their education and a good preparation



**Table 1.** Comparison of codes by frequency.

THEME	% of codes 2015 (n = 181)	% of codes 2022 (n = 151)	change
Environmental and technical factors	39%	34%	-5%
Preparation for nursing tasks	33%	24%	-9%
Human factors	13%	23%	+10%
Communication	8%	14%	+6%
Caliber of Equipment	7%	5%	-2%

for real-life nursing, “putting the textbook material into a real scenario... really brought it to life” (P7). This concept is also part of the preparation for nursing tasks theme discussed later in this section. In this study only one student indicated that the mannequin was not working 100% of the time, “It was nice to have mannequins ...but there’s a lot of things that weren’t working on them” (P7). In contrast, three of nine participants in the previous study cited issues with faulty equipment. It is possible that the increase use of simulation has resulted in an improved ability to operate the equipment.

A decrease of nine percent was seen in the *preparation for nursing tasks* theme. This was the largest area of decrease and may reflect a focus on scenario-based simulations that require the students to focus on more than just the nursing tasks as reflected in this comment, “Even just kind of having that practice of looking for things that are wrong and listening to your patient... being able to kind of identify some of those key pieces and diagnosing or even kind of intervening when something is going wrong with your patient” (P6). It is notable that all the participants indicated that the simulations they participated in were scenario based. Previous research indicated that some of the weekly simulation activities were “...just practice time” [11]. At twenty-four percent, *preparation for nursing tasks* was still an area that appears to be a significant part of the simulation laboratory experience.

The largest increase occurred in the *human factors* theme. Instructor preparedness and the authenticity of the scenario were factors that made simulation valuable as evidenced by the following comments, “My instructor really pushed me to elevate my thinking” (P2), and “there was a lot of effort put into the simulations to try and get them to be as close to real life as they could be” (P6). Other codes in the human factors theme were attitude and confidence/trust. Participants indicated that the attitude of the instructor and the student impacted the success of simulation experiences and helped them, “...gain more confidence for being a nurse” (P1). As the use of simulation has increased, it appears that instructors are providing more authentic simulation experiences.

The theme of *communication* increased from eight to fourteen percent, a gain of six percent. The most frequent context of the communication theme was



communication with physicians, mentioned by half of the participants. Participant six stated, "...that was something that took me a long time... to be really comfortable with calling doctors" (P6). Another code included in the communication theme was the mention of debrief. As was previously mentioned, three of the eight participants indicated that debrief was an important and constructive part of their simulation experience. Participant three stated, "Our debriefs were also organized in a way that helped us process the simulations, starting with patient symptoms, then nursing diagnoses, then answering a lot of *why* questions so we could learn more about the specific condition and how to deal with it" (P3). The increase incidence of the communication theme reflects the increase in codes related to talking with instructors, calling physicians, and discussions with fellow classmates during debrief sessions following simulation experiences.

The change in the *caliber of the equipment* theme was minimal, decreasing from seven percent of codes to just five percent of codes. Participants descriptions of simulation scenarios and the conducting of simulation activities indicated that the equipment was high-tech and interactive. It appears that having sophisticated mannequins is becoming the norm as the use of simulation has increased.

## 6. Conclusions

While some changes were noted between the original 2015 study and this research, the themes and coding were consistent with this research. As was previously discussed, the results were very similar to the previous study. It is vital the schools of nursing allocate fiscal and human resources to simulation programs. Nursing education is constantly evolving and needs to incorporate new technologies and best practices to make simulation education the best it can be as it has become necessary to use simulation to substitute for time in the clinical setting. This research could help schools of nursing open a dialogue to determine areas of concern and how to improve their institution's simulation experiences.

The use of simulation as a teaching tool is increasing. This was accelerated by the COVID-19 pandemic and students are generally benefitting from simulation-based education. This research could help schools of nursing to identify those aspects of simulation that students perceive to be valuable and to design simulation experiences that are efficient and effective in teaching the skills needed to be a successful nurse. This research indicates that there haven't been many significant changes in the seven years since the original study was conducted. Simulation use is increasing and schools of nursing need to invest time and resources into making those experiences of value to the participants.

The small sample size, which is characteristic of qualitative research, may impact the generalizability of this study. Additional research is needed to determine the most effective methods for implementing simulation as a substitute for clinical education. This research did not receive any specific grant from funding

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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